

FIGURE 1
(a) Initial state before gases turned on

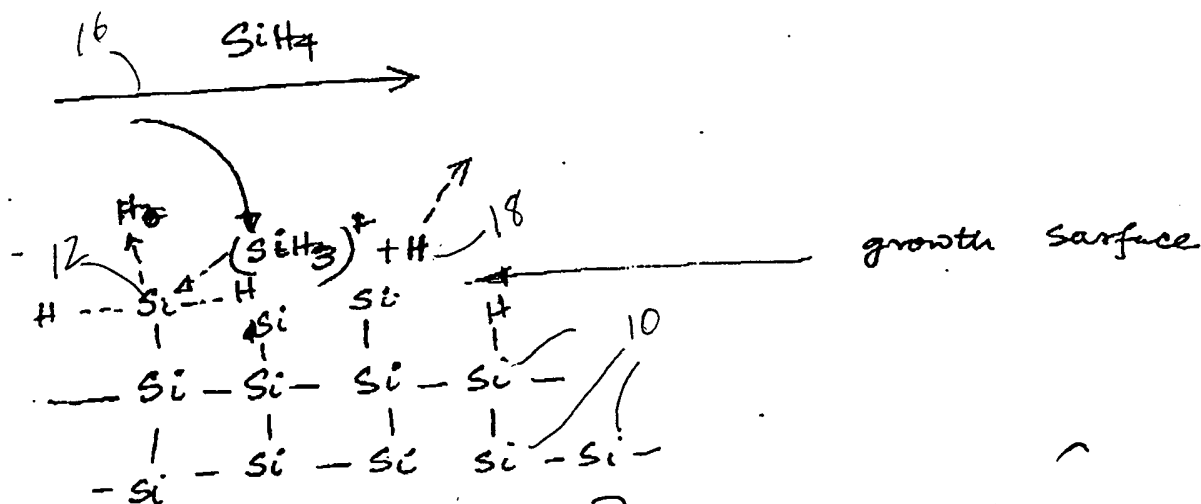


FIGURE 2
(b) SiH_4 creates activated species $(\text{SiH}_3)^*$ on the Si surface which move around till they find a favourable site to adsorb as Si and.

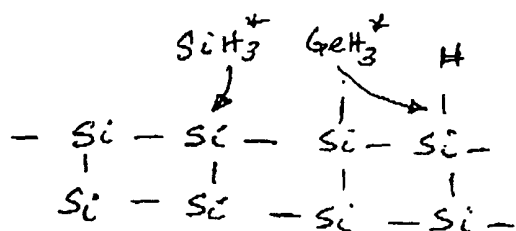
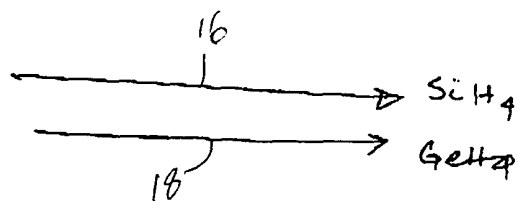


FIGURE 3

(c) presence of GeH_3^+ likely weakens the Si-H bond

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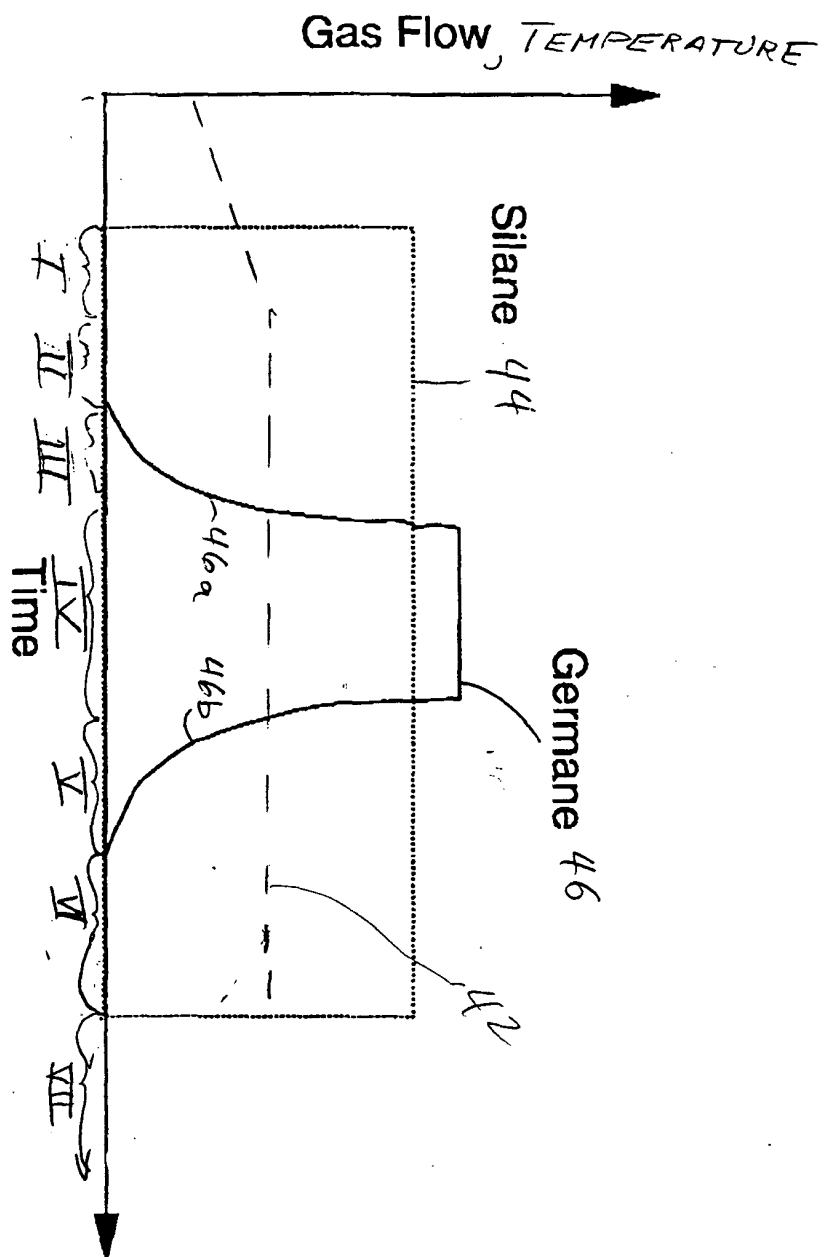


FIGURE 4

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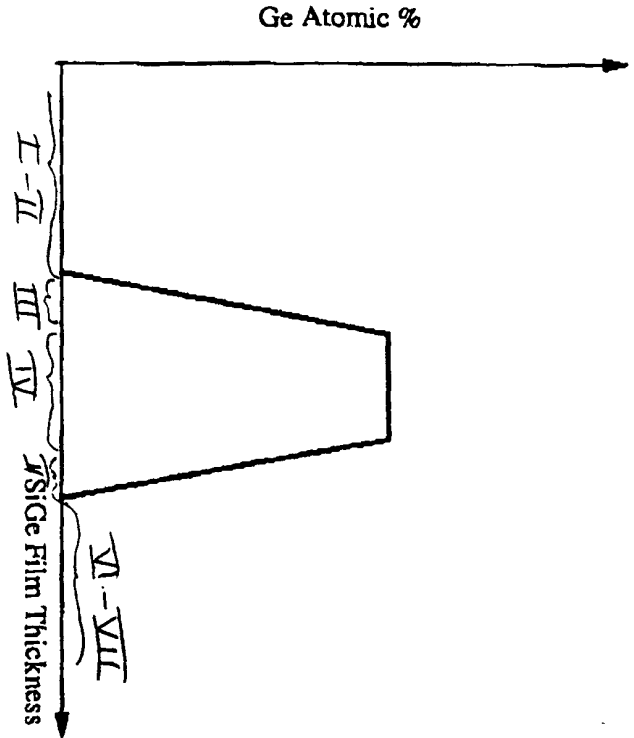


Figure 4

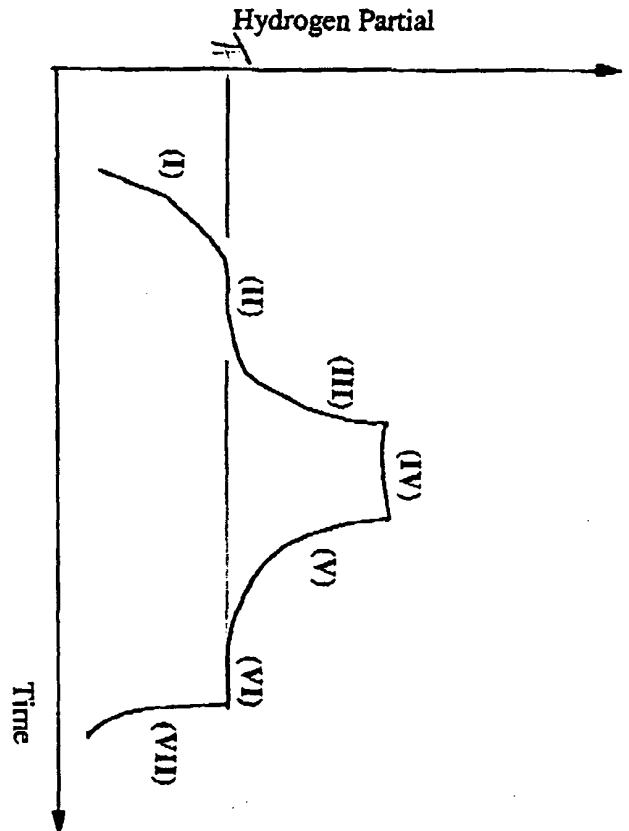


Figure 5

Determining SiGe profile: As shown in Fig. 1, the germanium profile has the following attributes; (a) Ge Plateau - Fixed Ge% for a certain film thickness, and (b) Ge Ramps - Increase/Decrease in Ge % over fixed film thickness. The usual method to determine such profiles rely on SIMS which is performed on samples after the growth is finished. SIMS is an ex-situ destructive technique which is expensive and also has a considerable turn-around time. In the invention proposed here, the attributes of the Ge profile are determined in-situ by monitoring the Hydrogen signal during the course of the growth. The Hydrogen detection is done by a Residual Gas Analysis system (RGA), which samples the gas

1. Generate Calibration Data

$\text{H}_2 \text{ Partial} \longleftrightarrow \text{GeH}_4 \text{ Flow}$
 $\text{Change in H}_2 \text{ Partial} \longleftrightarrow \text{Temperature Variation}$
 $\text{GeH}_4 \text{ Flow} \longleftrightarrow \text{SiGe Growth Rate}$
 $\text{GeH}_4 \text{ Flow} \longleftrightarrow \text{Ge\% in SiGe Film}$

2. In-situ Determination of Ge% 'vs' Film Thickness

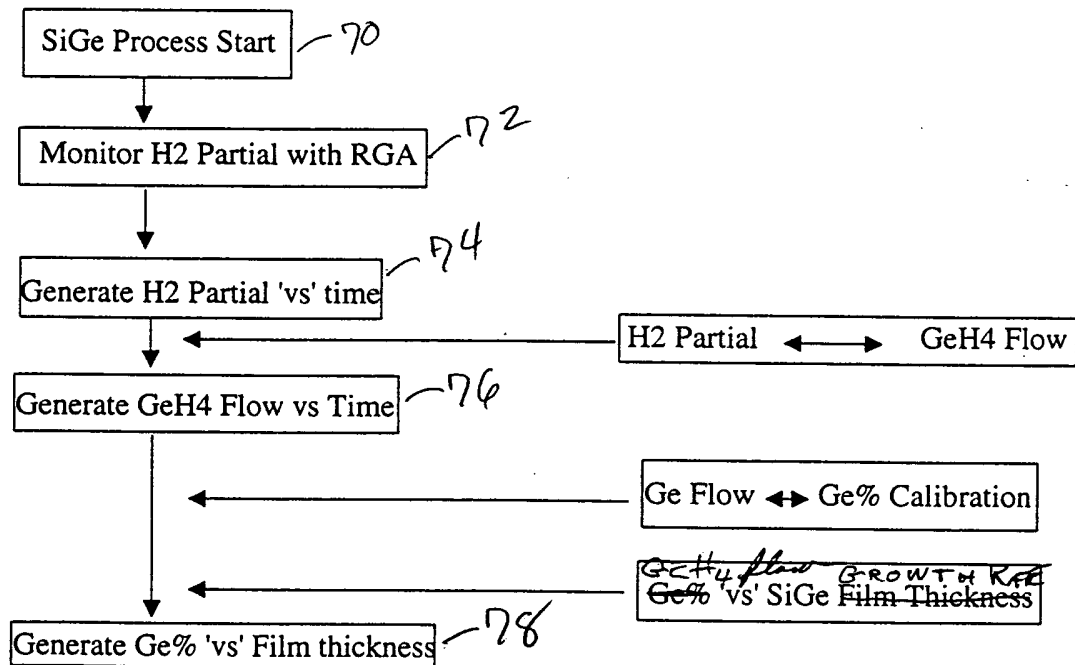


FIGURE 7

3. Temperature Monitoring

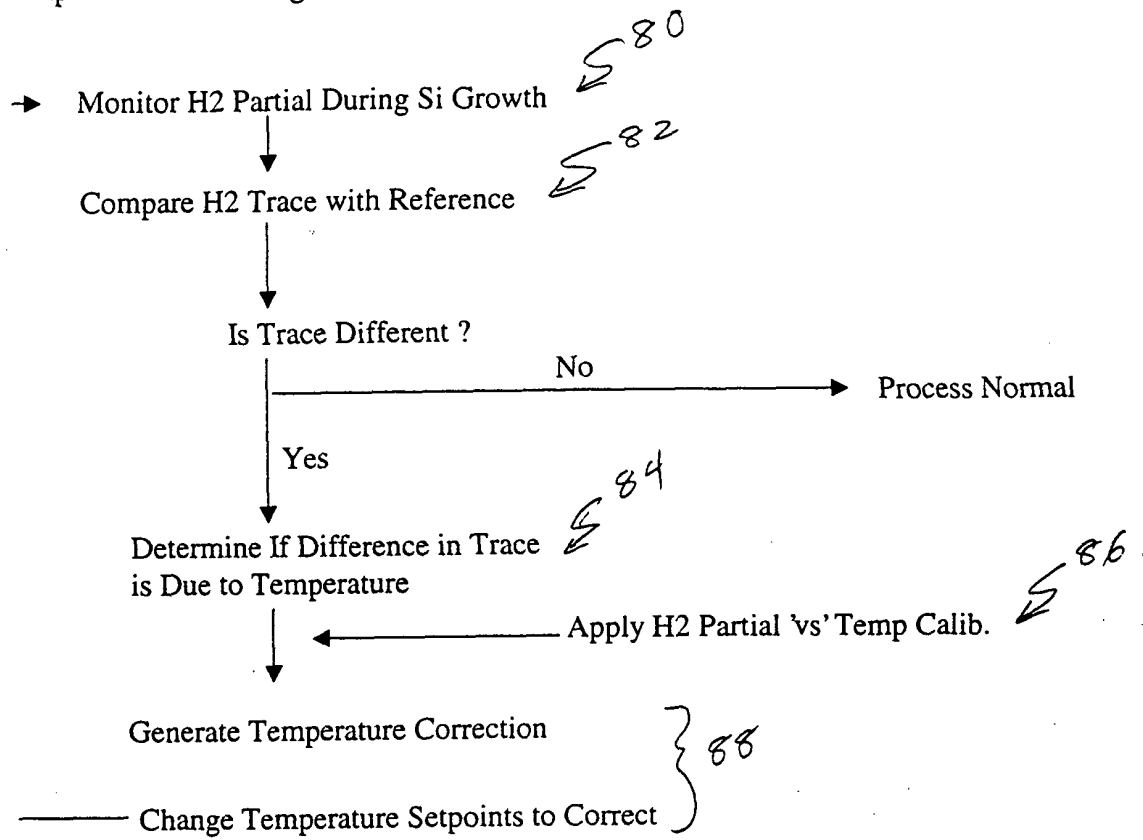


FIGURE 8

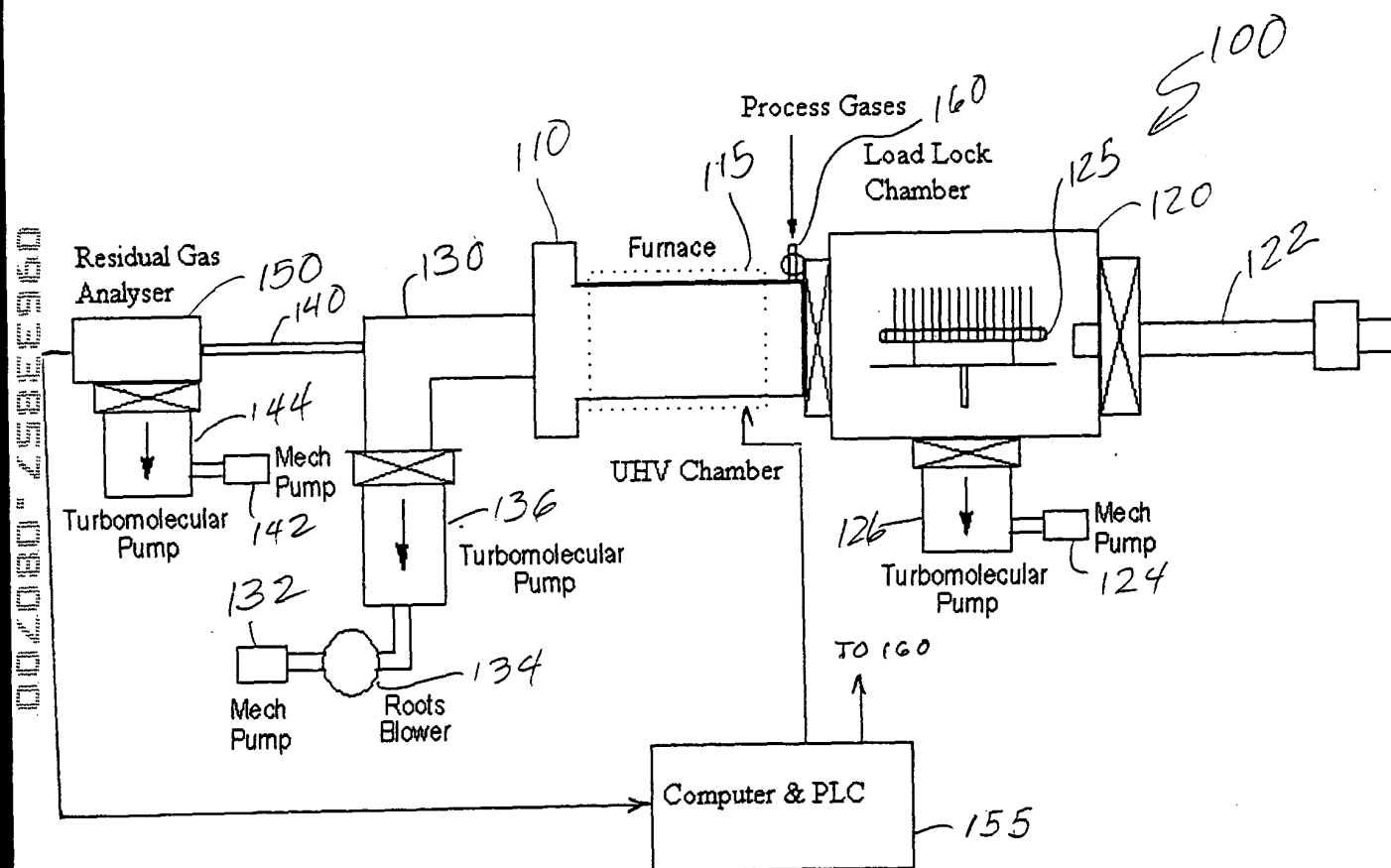


FIGURE 9.